

# ROTENONE TALKING POINTS

## PRESCOTT NATIONAL FOREST - 2020

### **Will Piscicide Application in Stock Tanks Affect Livestock or Wildlife?**

The proposed project includes applying piscicides to stock tanks on the Prescott National Forest. Since stock tanks are often the primary water source for permitted livestock on the Forest, we understand that you may have concerns regarding the safety of applying chemicals to this water source. At this time, the likely piscicide to be used is Rotenone. In 2011, an advisory committee was established to look into the effects of Rotenone on human and animals and this review was published in the, **Rotenone Review Advisory Committee final Report and Recommendations to the Arizona Game and Fish Department, December 31, 2011**. The following key excerpts from this report are meant to share information regarding concerns of the potential impacts of Rotenone on livestock.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean and pea family that are found primarily in Malaysia, South America, and East Africa. It is derived from ground up plant roots to make a powder formulation or extracted from the roots to make a liquid or crystalline formulation. People have utilized rotenone for centuries to capture fish for food in areas where these plants are naturally found, and it has been used in fisheries management as a piscicide (pesticide that kills fish) in North America since the 1930s. Rotenone affects gill breathing organisms by inhibiting respiration by blocking biochemical pathways of cell metabolism, specifically the reduced nicotinamide adenine dinucleotide (NADH)-dehydrogenase segment of the respiratory chain and resulting in mortality with prolonged exposure. Rotenone has also been used as an insecticide in residential products for control of fleas, ticks, and mites on pets and **livestock**; and for control of aphids on garden plants. Rotenone was used widely in North America for agricultural use as a botanical insecticide for use in fruit and vegetable crops.

### **Will wildlife or livestock be affected by grazing on vegetation along the perimeter of treated waters?**

Terrestrial wildlife may be exposed to treatment areas, but are unable to consume enough treated water or vegetation with rotenone residues to reach toxic levels. The EPA did not conduct a risk assessment to evaluate potential risk to birds and mammals from drinking rotenone treated water. However, the EPA studies for the human health risk assessments used rats to determine that the acute dietary exposure (drinking water only) of 200 ppb (maximum application concentration) is below the EPA determined Level of Concern (which is 1000 times less than the no observed adverse level). Finlayson et al. (2000) estimated that a 0.25 lb (0.113 kg) bird would need to consume 25 gallons of treated water in 24 hours to receive a lethal dose. Similarly for a large mammal, a cow weighing 1,620 lb (735 kg) would have to ingest 4,615 gallons of treated water (at 200 ppb treatment concentration) to reach a median lethal dose (EPA, personal communication).

It is possible that some birds and mammals may consume vegetation bordering stream or lake banks that was sprayed with rotenone during a piscicide treatment by an applicator operating a backpack sprayer unit. A human health and ecological risk assessment for rotenone completed for the U.S. Department of Agriculture, Forest Service, did not analyze this exposure scenario because they determined it irrelevant to aquatic applications (Durkin 2008). The EPA estimated exposure concentrations of rotenone in the form of foliar residues on vegetation (e.g., grass) that may be consumed by wildlife following non-piscicide applications of rotenone before the product registrants

withdrew their requests for reregistration for those uses of rotenone; the EPA considered wildlife exposure by way of piscicide applications to rotenone residues on vegetation unlikely.

### **Does rotenone affect all animals the same?**

No. Fish are most susceptible, with rotenone inhibiting a biochemical process at the cellular level making it impossible for fish to use the oxygen absorbed in the blood and needed in the release of energy during respiration. All animals including fish, insects, birds, and mammals have natural enzymes in the digestive tract that neutralize rotenone, and the gastrointestinal absorption of rotenone is inefficient. However, fish (and some forms of amphibians and aquatic invertebrates) are more susceptible because rotenone is readily absorbed directly into their blood through their gills (non-oral route) and thus, digestive enzymes cannot neutralize it.

### **References**

Finlayson, B., D. Skaar, J. Anderson, J. Carter, D. Duffield, M. Flammang, C. Jackson, J. Overlock, J. Steinkjer, and R. Wilson. 2018. Planning and standard operating procedures for the use of rotenone in fish management – rotenone SOP manual, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.